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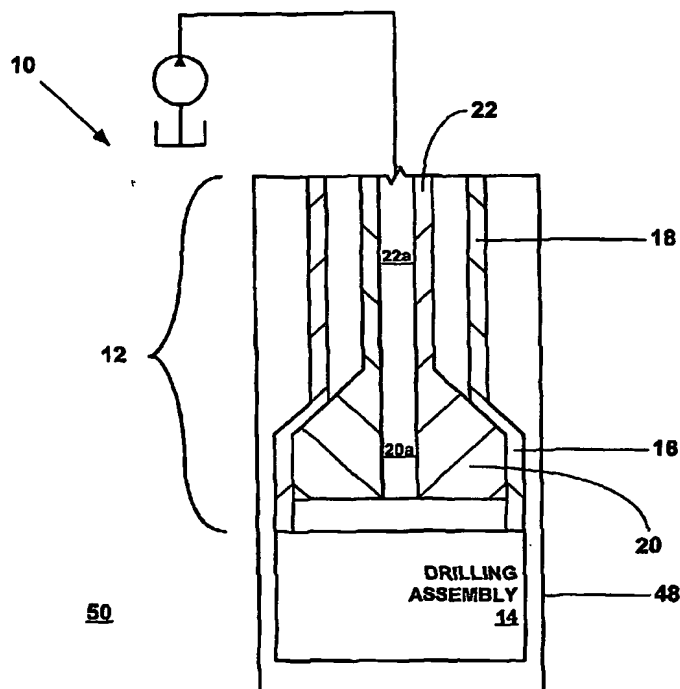
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[Continued on next page]

**(54) Title:** RADially EXPANDING CASING AND DRILING A WELLBORE

**(57) Abstract:** A method of radially expanding a wellbore casing (18) and drilling a wellbore (48).



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**AMENDED CLAIMS**

[received by the International Bureau on 13 April 2005 (13.04.05);  
original claims 1-22 are replaced by amended claims 1-24; claim]

1. An apparatus for radially expanding a tubular member and drilling a wellbore within a subterranean formation, comprising:
  - an expandable tubular member;
  - an expansion device coupled to the expandable tubular member adapted to radially expand and plastically deform the expandable tubular member within the wellbore comprising:
    - a tubular expansion mandrel; and
    - a tubular expansion mandrel launcher for housing the tubular expansion mandrel coupled to the expandable tubular member;
  - a pump coupled to the expansion device adapted to pump fluidic materials through the tubular expansion mandrel into a portion of the tubular expansion mandrel launcher;
  - a drilling device coupled to the expansion device adapted to receive the fluidic materials pumped into the portion of the tubular expansion mandrel launcher and drill the wellbore within the subterranean formation comprising:
    - one or more flow control elements for controlling the flow of the received fluidic materials;
    - a motor coupled to the flow control elements adapted to be operated by the fluidic materials; and
    - a drill coupled to the motor adapted to be driven by the motor; and
  - a controller coupled to the expansion device and the drilling device that is programmed to control the expansion device and the drilling device to operate in one of the following modes of operation: (a) drilling the wellbore using the drilling device or expanding the tubular member using the expansion device; or (b) drilling the wellbore using the drilling device and expanding the tubular member using the expansion device simultaneously.
2. The apparatus of claim 1, wherein the operational characteristics of the flow control elements vary as a function of the operational characteristics of the pumped fluidic materials.
3. The apparatus of claim 2, wherein the operational characteristics of the flow control elements comprise a resistance to flow of the fluidic materials.

4. The apparatus of claim 2, wherein the operational characteristics of the pumped fluidic materials comprise a frequency dependent component.

5. (Canceled)

6. A method of radially expanding a wellbore casing within a wellbore and drilling the wellbore through a subterranean formation, comprising:  
positioning an expandable casing, an expansion device for radially expanding the expandable casing, and a drilling device for extending the wellbore within the wellbore; and  
operating the expansion device and the drilling device using a method comprising:  
selecting drilling or expanding or drilling and expanding;  
if drilling or expanding is selected, then sequentially performing the following in any order:  
extending the wellbore using the drilling device; and  
expanding the casing using the expansion device; and  
if drilling and expanding is selected, then simultaneously performing the following:  
extending the wellbore using the drilling device; and  
expanding the casing using the expansion device;  
wherein the expansion device comprises an expansion mandrel.

7. A method of radially expanding a wellbore casing within a wellbore and drilling the wellbore through a subterranean formation, comprising:  
positioning an expandable casing, an expansion device for radially expanding the expandable casing, and a drilling device for extending the wellbore within the wellbore; and  
operating the expansion device and the drilling device using a method comprising:  
selecting drilling or expanding or drilling and expanding;  
if drilling or expanding is selected, then sequentially performing the following in any order:  
extending the wellbore using the drilling device; and  
expanding the casing using the expansion device; and  
if drilling and expanding is selected, then simultaneously performing the following:  
extending the wellbore using the drilling device; and  
expanding the casing using the expansion device;

wherein the expansion device comprises a rotating expansion device.

8. A method of radially expanding a wellbore casing within a wellbore and drilling the wellbore through a subterranean formation, comprising:
- positioning an expandable casing, an expansion device for radially expanding the expandable casing, and a drilling device for extending the wellbore within the wellbore; and
  - operating the expansion device and the drilling device using a method comprising:
    - selecting drilling or expanding or drilling and expanding;
    - if drilling or expanding is selected, then sequentially performing the following in any order:
      - extending the wellbore using the drilling device; and
      - expanding the casing using the expansion device; and
    - if drilling and expanding is selected, then simultaneously performing the following:
      - extending the wellbore using the drilling device; and
      - expanding the casing using the expansion device; and
  - varying the operational characteristics of at least one of the drilling device and the expansion device as a function of the operational characteristics of pumped fluidic materials.

9. The method of claim 8, wherein the operational characteristics of at least one of the drilling device and the expansion device comprise a resistance to flow of the fluidic materials.

10. The method of claim 8, wherein the operational characteristics of at least one of the drilling device and the expansion device comprise a frequency dependent component.

11. (Canceled)

12. A system for radially expanding a wellbore casing within a wellbore and drilling the wellbore through a subterranean formation, comprising:
- means for positioning an expandable casing, an expansion device for radially expanding the expandable casing, and a drilling device for extending the wellbore within the wellbore; and
  - means for operating the expansion device and the drilling device comprising:
    - means for selecting drilling or expanding or drilling and expanding;

if drilling or expanding is selected, then means for sequentially performing the following in any order:

extending the wellbore using the drilling device; and  
expanding the casing using the expansion device; and

if drilling and expanding is selected, then means for simultaneously performing the following:

extending the wellbore using the drilling device; and  
expanding the casing using the expansion device; and

means for varying the operational characteristics of at least one of the drilling device and the expansion device as a function of the operational characteristics of the pumped fluidic materials.

13. The system of claim 12, wherein the operational characteristics of at least one of the drilling device and the expansion device comprise a resistance to flow of the fluidic materials.

14. The system of claim 12, wherein the operational characteristics of at least one of the drilling device and the expansion device comprise a frequency dependent component.

15. An apparatus for radially expanding a tubular member and drilling a wellbore within a subterranean formation, comprising:

an expandable tubular member;

an expansion device coupled to the expandable tubular member adapted to radially expand and plastically deform the expandable tubular member within the wellbore;

a drilling device coupled to the expansion device adapted to drill the wellbore within the subterranean formation; and

a controller coupled to the expansion device and the drilling device that is programmed to control the expansion device and the drilling device to operate in one of the following modes of operation: (a) drilling the wellbore using the drilling device or expanding the tubular member using the expansion device; or (b) drilling the wellbore using the drilling device and expanding the tubular member using the expansion device simultaneously.

16. The apparatus of claim 15, wherein the expansion device comprises an expansion mandrel.

17. The apparatus of claim 15, wherein the expansion device comprises a rotating expansion device.
18. The apparatus of claim 15, wherein the controller comprises one or more flow control elements whose operational characteristics are frequency dependent.
19. An apparatus for radially expanding a tubular member and drilling a wellbore within a subterranean formation, comprising:
- an expandable tubular member;
  - an expansion device coupled to the expandable tubular member adapted to radially expand and plastically deform the expandable tubular member within the wellbore comprising:
    - a tubular expansion mandrel; and
    - a tubular expansion mandrel launcher for housing the tubular expansion mandrel coupled to the expandable tubular member;
  - a pump coupled to the expansion device adapted to pump fluidic materials through the tubular expansion mandrel into a portion of the tubular expansion mandrel launcher;
  - a drilling device coupled to the expansion device adapted to receive the fluidic materials pumped into the portion of the tubular expansion mandrel launcher and drill the wellbore within the subterranean formation comprising:
    - one or more flow control elements for controlling the flow of the received fluidic materials;
    - a motor coupled to the flow control elements adapted to be operated by the fluidic materials; and
    - a drill coupled to the motor adapted to be driven by the motor; and
  - a controller coupled to the expansion device and the drilling device that is programmed to control the expansion device and the drilling device to operate in one of the following modes of operation: (a) drilling the wellbore using the drilling device or expanding the tubular member using the expansion device; or (b) drilling the wellbore using the drilling device and expanding the tubular member using the expansion device simultaneously;
- wherein the operational characteristics of the flow control elements vary as a function of the operational characteristics of the pumped fluidic materials;
- wherein the operational characteristics of the flow control elements comprise a resistance to flow of the fluidic materials; and
- wherein the operational characteristics of the pumped fluidic materials comprise a

frequency component.

20. A method of radially expanding a wellbore casing within a wellbore and drilling the wellbore through a subterranean formation, comprising:
- positioning an expandable casing, an expansion device for radially expanding the expandable casing, and a drilling device for extending the wellbore within the wellbore; and
  - operating the expansion device and the drilling device using a method comprising:
    - selecting drilling or expanding or drilling and expanding;
    - if drilling or expanding is selected, then sequentially performing the following in any order:
      - extending the wellbore using the drilling device; and
      - expanding the casing using the expansion device;
    - if drilling and expanding is selected, then simultaneously performing the following:
      - extending the wellbore using the drilling device; and
      - expanding the casing using the expansion device; and
    - varying the operational characteristics of at least one of the drilling device and the expansion device as a function of the operational characteristics of pumped fluidic materials;
- wherein the operational characteristics of at least one of the drilling device and the expansion device comprise a resistance to flow of the fluidic materials; and
- wherein the operational characteristics of at least one of the drilling device and the expansion device comprise a frequency dependent component.

21. A system for radially expanding a wellbore casing within a wellbore and drilling the wellbore through a subterranean formation, comprising:
- means for positioning an expandable casing, an expansion device for radially expanding the expandable casing, and a drilling device for extending the wellbore within the wellbore;
  - means for operating the expansion device and the drilling device comprising:
    - means for selecting drilling or expanding or drilling and expanding;
    - if drilling or expanding is selected, then means for sequentially performing the following in any order:
      - extending the wellbore using the drilling device; and
      - expanding the casing using the expansion device; and
    - if drilling and expanding is selected, then means for simultaneously



performing the following:

extending the wellbore using the drilling device; and

expanding the casing using the expansion device; and

means for varying the operational characteristics of at least one of the drilling device and the expansion device as a function of the operational characteristics of pumped fluidic materials;

wherein the operational characteristics of at least one of the drilling device and the expansion device comprise a resistance to flow of the fluidic materials; and

wherein the operational characteristics of at least one of the drilling device and the expansion device comprise a frequency dependent component.

22. An apparatus for radially expanding a tubular member and drilling a wellbore within a subterranean formation, comprising:

an expandable tubular member;

an expansion device coupled to the expandable tubular member adapted to radially expand and plastically deform the expandable tubular member within the wellbore;

a drilling device coupled to the expansion device adapted to drill the wellbore within the subterranean formation; and

a controller coupled to the expansion device and the drilling device that is programmed to control the expansion device and the drilling device to operate in one of the following modes of operation: (a) drilling the wellbore using the drilling device or expanding the tubular member using the expansion device; or (b) drilling the wellbore using the drilling device and expanding the tubular member using the expansion device simultaneously;

wherein the controller comprises one or more flow control elements whose operational characteristics are frequency dependent.

23. A method of radially expanding a wellbore casing within a wellbore and drilling the wellbore through a subterranean formation, comprising:

positioning an expandable casing, an expansion device for radially expanding the expandable casing, and a drilling device for extending the wellbore within the wellbore; and

operating the expansion device and the drilling device using a method comprising:

selecting drilling or expanding or drilling and expanding;

if drilling or expanding is selected, then sequentially performing the following

in any order:

extending the wellbore using the drilling device; and  
expanding the casing using the expansion device; and  
if drilling and expanding is selected, then simultaneously performing the  
following :  
extending the wellbore using the drilling device; and  
expanding the casing using the expansion device;  
wherein the casing is expanded in a direction toward a top of the casing.

24. A system for radially expanding a wellbore casing within a wellbore and drilling the wellbore through a subterranean formation, comprising:
- means for positioning an expandable casing, an expansion device for radially expanding the expandable casing, and a drilling device for extending the wellbore within the wellbore; and
  - means for operating the expansion device and the drilling device using a method comprising:
    - means for selecting drilling or expanding or drilling and expanding;
    - if drilling or expanding is selected, then means for sequentially performing the following in any order:
      - extending the wellbore using the drilling device; and
      - expanding the casing using the expansion device; and
    - if drilling and expanding is selected, then means for simultaneously performing the following:
      - extending the wellbore using the drilling device; and
      - expanding the casing using the expansion device;
- wherein the casing is expanded in a direction toward a top of the casing.